

Task Order 08-10 EVA Support

1.0 TITLE OF EFFORT: Extravehicular Activity (EVA) Projects Support (WBS 1.2.2)

2.0 TASK DESCRIPTION: Coordinate and conduct S&MA activities for authorized Extravehicular Activity quality and flight equipment projects, provide and discuss S&MA topics and issues, and participate in all S&MA activities associated with the EVA GFE life-cycle as defined in EA-WI-023 and EA-WI-025. Provide support to pre-flight activities and on-orbit operations including integrated operations assessments. Review proposals and change requests for system designs and design modifications in order to assess S&MA impacts and identify S&MA issues for GFE assets.

2.1 Statement of Work Reference: Section 6.0 - JSC Project Support

2.2 Requirements:

2.2.1 EVA GFE

2.2.1.1 EVA GFE Safety and Reliability (WBS 1.2.2.1)

Perform flight safety, reliability, and mission assurance for GFE.

- a. Participate in development and modification of hardware and software to identify and discuss hardware criticality assessments and define S&MA requirements, identify design problems and provide design solutions or improvements.
- b. Participate in design reviews, review provided data and documentation, and provide RID'S on S&MA-related issues and deficiencies.
- c. Identify potential hazards, evaluate proposed hazard controls, and evaluate methods for verification of hazard controls.
- d. Identify potential critical items list failure modes, causes, effects indicators of verification, and acceptance rationale.
- e. Track and provide status on requirements verification, system qualification, and design certification activities.
- f. Identify missing or non-compliant S&MA requirements as well as performance requirements that cannot be verified. Assess waivers to assure adequate and appropriate acceptance rationales are provided.
- g. Conduct S&MA assessments, prepare presentations, and present results of those assessments to S&MA management, program/project management, and the EVA Project Office for discussion.
- h. Assure that hardware operational uses, operating limits, hazard controls, and fault tolerance are verified prior to flight.
- i. In accordance with JSC 28035, participate in problem/anomaly investigations of design and safety related problems during all phases of a project to assure that the problems are appropriately documented; adequate and appropriate investigation is planned and conducted to identify both proximate and root causes; interim and final closure rationale is acceptable; corrective action (if taken) is appropriate and effective; closure documentation (including trend coding) is thorough and complete; and visibility of the problem/anomaly is elevated to the appropriate S&MA management level.
- j. Support operational use of hardware and software. Participate in development of CHIT'S in order to assure compliance with S&MA and performance requirements.
- k. Submit Operational Constraints for Extravehicular Activity and flight equipment projects and assure the operational constraints are officially approve for each flight in the Operational Control Agreement Database (OCAD).
- l. Perform updates to safety documentation for the SAFER as driven by hardware design modifications or changes to operations and present/deliver such updates to the FESRRP and PRCB for approval.
- m. Supply special assessments (e.g., PRA and trade studies) and involve subject matter experts as required.

- n. Complete training/certification requirements.
- o. Perform review of the EVA Support Equipment Lists (ESEL's) to ensure the manifest plans meet S&R mission assurance goals.
- p. In accordance with NT-CWI-004, conduct a risk assessment for shipments with open issues requiring NT management concurrence.

2.2.1.2 EVA GFE Quality Assurance (WBS 1.2.2.2)

2.2.1.2.1 EVA GFE In-Line Quality Assurance

For in-line Quality Assurance support for GFE performed on the One EVA contract, the contractor shall:

- a. Perform non-RITF related in-line hardware inspection, verification, and documentation tasks associated with receiving, inspecting, fabricating, assembling, testing, processing, and shipping of GFE at JSC facilities.
- b. Perform and assign as required designated Mandatory Inspection Points (MIP's).
- c. Oversee facility maintenance on human-rated chambers and testing labs, and support fit-checks, installation, test readiness, test, and checkout of hardware at JSC and other NASA and contractor facilities.
- d. Perform in-line support of the Bond Rooms for shipping and receiving of flight hardware.
- e. Perform designated Mandatory inspection Points (MIP's) on One EVA hardware and projects at other NASA centers as requested by EVA Project Office.
- f. Maintain NT QAS ISO work instructions
- g. Develop and submit Weekly Activity Report to the NASA Monitor of all activities completed or in process.

2.2.1.2.2 EVA GFE Surveillance Quality Assurance

For contract surveillance of the Engineering and Science Contract (ESC), the contractor shall:

- a. Perform and assign as required designated Government Mandatory Inspection Points (GMIP's).
- b. Conduct surveillance of flight systems handling and processing as well as ground facilities with regard to receiving, inspecting, fabricating, assembling, testing, processing, and shipping of GFE at JSC facilities per the surveillance plan.
- c. Participate as team members or team leaders of process and requirements implementation audits conducted at JSC and contractor facilities.
- d. Perform surveillance of the Bond Rooms which are responsible for ESC hardware.
- e. Perform, prepare and enter into the appropriate database Surveillance Reports of the ESC Inline activities.
- f. Assist QE in analyzing surveillance data including recommendations for necessary audits and level of surveillance for each area of interest based upon surveillance findings.

2.2.1.2.3 EVA Quality Assurance at the Neutral Buoyancy Laboratory

- a. Participates in assigned Manned Post Test Debriefs to capture and record anomalies.
- b. Generate/Issue/Close Interim Discrepancy Reports, provide to the responsible engineers, and track to closure.
- c. Perform process surveillance assessments specific to the USA EMU and Tool Labs per the Surveillance Plan.
- d. Aid in the resolution of poolside anomalies.
- e. Develop and submit Weekly Activity Report to the NASA Monitor of all activities 7 completed or in process.
- f. Participate on NBL incident response and investigation teams.
- g. Support 1st or 2nd shift, depending on the NBL operations.
- h. Participate as a formal (sign off) member of the Test Readiness Review Board

2.2.1.3 EVA GFE Quality Engineering (WBS 1.2.2.3)

2.2.1.3.1 Provide Quality Engineering surveillance support for EVA GFE developed at JSC

- a. Review GFE requirements with respect to EVA requirements and JSC standards and processes.
- b. Implement surveillance of GFE design and development process as defined in EA-WI-023.
- c. Provide surveillance of JSC processes and products with respect to applicable SLPs, including manufacturing, assembling and testing of hardware and associated Work Authorizing Documents (WADs).
- d. Review and approve MRBs.
- e. Develop GMIP Plans or assign GMIPs to CRIT 1 or 2 WADs as applicable in accordance with NPR 8735.2.
- f. Provide surveillance of acceptance for flight (readiness for shipment) process.
- g. Review acceptance data packages (ADP's) to verify completeness and compliance to EVA requirements.
- h. Review and assess GFE readiness for government acceptance. Provide status of readiness in support of System Acceptance Review (SAR).
- i. Provide surveillance of receiving, inspection, processing, and shipment of GFE at JSC facilities.
- j. Analyze surveillance data; define criteria for establishing sampling and prompting audits. Provide monthly metrics and associated report, including recommendations for necessary audits and level of surveillance for each area of interest based upon surveillance findings.
- k. Maintain NT QE ISO work instructions.
- l. Provide administrative function for Quality Steering Team Review (QSTR) Board and associated Process-Based Mission Assurance (PBMA) secure workgroup website.
- m. Support weekly staff meetings with respect to significant accomplishments, issues, and schedules.

2.2.7.3.2 Provide Quality Engineering in-line support for EVA GFE.

- a. Review flight hardware/software, GSE documents and specifications with respect to all facets of quality engineering, e-g., manufacturability, appropriate sequence of events, appropriate standards.
- b. Review plans, procedures, processes, controls and inspection requirements.
- c. Evaluate inspection/test methods, tools, instruments, and processes.
- d. Identify Mandatory Inspection Points (MIPS).
- e. Investigate problems that have occurred at the onsite JSC fabrication and test facilities and define causes, effects, conditions, and associated procedures related to problem areas, and review history of similar problems.
- f. Participate in discussions and meetings with JSC design groups, technical divisions.
- g. Provide review and assistance in the development of critical items lists (CILs) as a derivative of the failure modes and effects analysis (FMEA).
- h. Provide Quality Engineering coverage in selected onsite facilities and test area.
- i. Review rejections and/or nonconformances of delivered or manufactured articles. Considerations will include materials, processes, manufacturing methods, inspection and test techniques, handling, and storage.
- j. Prepare and/or provide recommendations for revisions to quality assurance plans for selected onsite facilities and tests.
- k. Evaluate GFE engineering change requests for quality engineering impact. Provide recommendations for acceptance, rejection, or modification to the changes.
- l. Participate in and support test readiness reviews, user readiness reviews, operational readiness reviews and the associated boards to validate configuration and acceptability of proceeding with the associated event. This includes supporting the event itself, e.g., a test.
- m. Maintain a current status of work progress and problems and prepare technical briefings to include previous test problems and open items on test articles and facilities that might affect test planning and operation.

- n. Review the board agenda items, identify key issues, and prepare necessary IS&QD inputs to the SR&QA board member, by providing recommendations.
- o. Perform in-depth reviews of test plans and procedures.
- p. Review and approve GFE and GSE drawings in accordance with JPR 8500.4.
- q. Participate and conduct Pre-shipment Readiness Reviews in accordance with NT-CWI-004.
- r. In accordance with JSC 28035, participate in problem/anomaly investigations of manufacturing related problems during all phases of a project to assure that the problems are appropriately documented; adequate and appropriate investigation is planned and conducted to identify both proximate and root causes; interim and final closure rationale is acceptable; corrective action (if taken) is appropriate and effective; closure documentation (including trend coding) is thorough and complete; and visibility of the problem/anomaly is elevated to the appropriate S&MA management level.

2.2.1.4 EVA GFE Software Assurance (WBS 1.2.2.4)

Provide Software Assurance, including software safety, software reliability, software quality engineering, software quality assurance, and software verification and validation for GFE flight and ground systems performed at JSC.

- a. Define Software Assurance requirements.
- b. Ensure the conformance of software life-cycle processes and products to Software Assurance requirements, standards, and procedures.
- c. Perform process and product assessment throughout the life-cycle to provide objective insight into the maturity and quality of the software processes and products.
- d. Provide support to boards and panels.
- e. Ensure that the software safety requirements are clearly identified, documented, traced and controlled throughout the software life-cycle.
- f. Perform analysis of the consistency, completeness, correctness and testability of software safety requirements.
- g. Ensure the testing of software safety critical components are sufficiently
- h. implemented and that applicable controls are in place to verify all safety conditions.
- i. Conduct analysis of proposed changes on software safety.
- j. Evaluate the reliability of the software products created throughout the life-cycle.
- k. Ensure that the software being developed or maintained satisfies the functional and performance requirements.
- l. Ensure that each phase of the development process yields the right software products.
- m. Participate in major milestone reviews and certification/acceptance of the software.
- n. Conduct surveillance of GFE software life-cycle activities.

2.2.4.5 EVA Operations (WBS 1.2.2.5)

Provide support to on-orbit planning, training, and flightstage EVA operations.

- a. Support EVA mission crew training and simulations.
- b. Perform EVA risk assessments.
- c. Prepare Operational Risk Assessment Executive Summary Reports (ORAESR's).
- d. Provide real-time flight support.
- e. Participate in investigations of in-flight anomalies and failures, and in the implementation of problem resolutions.
- f. Perform operations support to the MER and SPIT as needed to resolve issues.
- g. Review integrated hazard reports, supply comments, and provide real-time review support to the ISS SRP and/or JSERP.
- h. Provide evaluations on SODF, Flight Rule, FDF, and program-level CRs as applicable to EVA.
- i. Complete training requirements toward ISS MER console operator certification.
- j. Participate in pre-flight and in-flight EVA Team 4/Tiger Team activities.
- k. Supply EVA and flight readiness assessments per the process and criteria documented in JSC-28222, "EVA CoFR Requirements and Implementation Plan."
- l. Provide readiness assessments to the following reviews: CoFR/CoFR2,

- m. CoER1/CoER2, SMARR, SMSR, STR Board, and Center Director pre-FRR.

2.2.1.6 EVA/CRAVE Audits (WBS 1.2.2.8)

For support of EVA/CRAVE GFE/CFE Audits, the contractor shall participate in NASA sponsored audits as defined by the Audit Management Office in accordance with NTADM-004 and NT-ADM-008 at JSC, other NASA Centers and contractor's facilities.

- a. Provide Lead and/or participating auditors for Gap Studies, Pre-award, Capability, QMS, etc.
- b. Document findings and prepare the final report.
- c. Provide support to scheduled Audit meetings.
- d. Participate in the Joint Audit Planning Committee.
- e. Perform statistical analyses, and benchmark S&MA processes.
- f. Perform technical and metric analyses, and present results.
- g. Participate in NASA Headquarters mandated audits (i.e., PA&R, IPS, IFO, etc.).

2.2.1.7 EVA Flight Readiness (WBS 1.2.2.7)

Assesses and evaluate data and documentation in accordance with NT-ADM-014 and make recommendations for flight readiness of GFE projects. Specific tasks include, but are not limited to:

- a. Data – Records Management
 - Evaluate CCB Change Requests (CR's) and other Program documents to identify flight GFE that has been manifested for flight.
 - Review mission hardware certification length/missions to ensure certification is current for the mission duration.
 - Support GFE engineers in collection and management of data that supports S&MA CoFR evaluation and status reporting in this task order.
 - Implement and manage centralized CoFR endorsement status collection and reporting capability to the frequency defined in NT-ADM-014
 - Evaluate and update NT-ADM-014 to remain current with Program unique CoFR reporting requirements.
 - Track requirements verification and certification status.
 - Assess the configuration and utilization plans against flight certifications.
 - Prepare Certification of Flight Readiness (CoFR) presentations and support to CoFR meetings to discuss status and issues related to MRB's, system acceptance, open items status (1027), data trends, and audit reports.
 - Identify data and information required for accomplishment of S&MA responsibilities and functions leading to flight readiness assessments and CoFR endorsements. Assess adequacy of data and information to support flight readiness activities.
 - Provide status of all open CoFR endorsements, including PRACA and GCAR items, and track the open status through closure to support CoFR presentations.
 - Assess QARC documentation on flight item manufacturing and test results in order to report on the status of these items in support of Flight Readiness.
 - Perform engineering review of flight GFE for its intended application, including launch, landing and on-orbit operations.
- b. GFE Records Management in Support of Flight Readiness
 - Staff satellite record centers to maintain configuration, status accounting and accessibility to work authorizing and shipping records and data created by engineering according to NASA records requirements
 - Maintain configuration and accessibility of S&MA approved GFE hardware certifications and certificates according to NASA records requirement.
 - Maintain configuration and accessibility of JSC GFE PRACA Records to JSC 28035 and NASA records requirements.
 - Evaluate program data requirements for impact to S&MA work instructions, records management and flight readiness activity.

2.2.2 CRAVE Support (WBS 1.2.2.9)

Crew, Robotics, and Vehicle Equipment (CRAVE') activities to be supported are described in Internal Task Agreement (ITA) no. 9085. Activities will include Safety and Reliability, Quality Assurance, Quality Engineering, Software Assurance, Operations, Audits, Flight Readiness, and Sustaining Engineering. CRAVE Project to be worked, as identified in ITA no. 9085, include:

- Trace Gas Analyzer
- Urine Monitoring System
- Refrigerator Freezer Services
- Enhanced Right Angle Drive
- Tile Repair Hand Tools
- Large Area Repair Build to Print
- Large Area Repair Config Mgmt
- Large Area Repair PGT Stand
- Large Area Repair Fastener
- Large Area Repair Punch & Handle
- Sublimator Driven Coldplate
- Chamber V GSE
- Flight Hardware Development

2.2.3 Miscellaneous Engineering Hardware Support (WBS 1.2.2.6)

EVA Tools and Equipment Branch (EC7) activities to be supported are described in Internal Task Agreement (ITA) no. 9086. Activities will include Safety and Reliability, Quality Assurance, Quality Engineering, Software Assurance, Operations, Audits, Flight Readiness, and Sustaining Engineering. EC7 Project to be worked, as identified in ITA no. 9086, include:

- EVA Thermal Sensor
- Crack Repair Palette
- Crack Repair Bag
- EVA Punch Tool
- EVA Scrapers
- Manual Crack Repair Gun
- Gap Gauges
- RCC Drills
- Plug Installation Tool
- EVA Marker
- Ruler/Protuberance Gauge
- HST Tools
- MMWS Tool Stowage Caddy
- Plug Repair Assembly
- Crack Repair Material
- Plug Installation Verification Tool
- Tile Overlay Assembly and Tools
- Tile Repair Ablative Dispenser
- ORU Temp Stowage Device
- REBA Batteries
- Shuttle Slidewire

' The Crew, Robotics, and Vehicle Equipment (CRAVE) contract primarily consists of work required to perform the design, development, testing, manufacturing, and evaluation (DDTM8E) and sustaining engineering (SE) necessary to certify, deliver and maintain Extravehicular Activity (EVA) equipment, Flight Crew Equipment (FCE), Crew Health Care Systems (CHeCS), Extravehicular Robotics (EVR) equipment, Environmental Control and Life Support (ECLSS) equipment, and Active Thermal Control Systems (ATCS) equipment, including ground support equipment (GSE). The products and services provided through CRAVE will support the Space Shuttle, the International Space Station (ISS), and advanced programs of Government-Furnished Equipment (GFE) for future human Space Flight programs. GFE consists of both mechanical and electrical/electronic hardware and software elements

2.2.4 Shuttle RCC Large Area Repair (WBS 1.2.2.0)

The Space Shuttle Reinforced Carbon-Carbon (RCC) Large Area Repair (LAR) activities to be supported are described in Internal Task Agreement (ITA) no. 9086. Activities will include Safety and Reliability, Quality Assurance, Quality Engineering, Operations, Audits, Flight Readiness, and Sustaining Engineering. The Shuttle LAR Project to be worked, as identified in ITA no. 9086, includes:

- Existing Hardware Modification
- EVA Gap Gauge
- EVA Punch Tool
- Manual Crack Repair Gun
- ORU Transfer Bag

- Plug Installation Verification Tool
Torque Limiter
- EVA fastener/washer retention
hardware
- New Hardware Development
- EVA Hole Punch Tool
- RCC drill with stop
- EVA fastener/washer retention
hardware
- Crew handling and training aids

2.3 Deliverables:

Audit Reports
QREX Reports
Approved ADP's
Technical & surveillance metric analyses
PBS Surveillance Reports

3.0 PERIOD OF PERFORMANCE: October 1, 2009 – April 30, 2010

4.0 ESTIMATED COSTS:

Contractor may provide travel, training, materials, and other non-labor resources as necessary to support task order requirements. Training may include selected professional discipline-based or spaceflight-based conferences with approval of the TMR.